

## BEHAVIOUR OF SOIL STRUCTURE IN DOUBLE-POROSITY KAOLIN MEDIA USING LIGHT TRANSMISSION VISUALIZATION (LTV) METHOD

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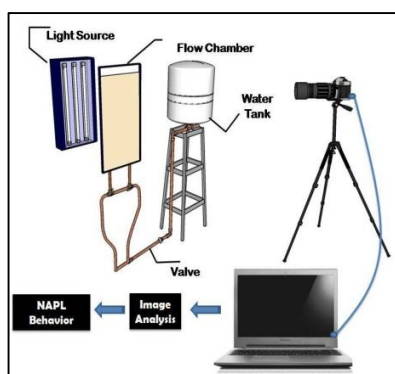
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### Graphical abstract



### Abstract

Double-porosity is a phenomenon that occurs naturally and can be found in many subsurface media such as rock aquifers, agricultural top-soils, and compacted soils. These media have different pore size characteristics that result in different hydraulic properties. Two approaches were used to create the double-porosity soil structure using kaolin clay to be tested in migration of contaminants experiments using light transmission visualization (LTV) method. Aggregated kaolin and sintered clayey spheres mixture were used as the media for the first and second test, respectively. The observation shows that the first approach is not viable for a saturated-porous medium because kaolin particles have disintegrated and turned into emulsion. In contrast, uniform kaolin particles that remain strong and solid have been produced by using the second approach. In conclusion, the LTV method is viable to monitor the behavior of fluids in porous media under different conditions.

**Keywords:** Clayey spheres, double-porosity, kaolin, light transmission visualization, porous media, soil structure

### Abstrak

Keliangan berganda adalah fenomena yang berlaku secara semula jadi dan boleh didapati dalam banyak media subpermukaan seperti akuifer batu, tanah atas pertanian dan tanah terpadat. Media ini mempunyai ciri-ciri saiz liang berbeza yang menyebabkan sifat hidraulik yang berbeza. Dua pendekatan telah digunakan bagi menghasilkan struktur tanah keliangan berganda menggunakan tanah liat kaolin untuk digunakan dalam ujikaji pergerakan bahan cemar melalui kaedah gambaran pemindahan cahaya (LTV). Kaolin keras dan campuran bebola liat tersinter telah digunakan sebagai media, masing-masing untuk ujian pertama dan kedua. Pemerhatian menunjukkan bahawa pendekatan pertama tidak sesuai untuk medium berliang tepu kerana zarah kaolin telah hancur dan bertukar menjadi emulsi. Sebaliknya, zarah kaolin seragam yang kekal kukuh dan pejal dapat dihasilkan dengan menggunakan pendekatan kedua. Kesimpulannya, kaedah LTV ini berupaya untuk memantau kelakuan bendalir dalam media berliang dalam keadaan yang berbeza.

**Kata kunci:** Bebola liat, keliangan berganda, kaolin, gambaran pemindahan cahaya, media berliang, struktur tanah

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